The Comparability and Validity of Teacher and Caregiver Ratings Regarding Young Children's Development

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Undergraduate thesis presented in partial fulfillment of the requirements for graduation with research distinction in Human Sciences, College of Education and Human Ecology, The Ohio State University

April 2015

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Acknowledgments

First, I would like to thank my parents for providing me the opportunities that allowed me to get where I am today, and their continued support throughout my academic journey and research.

I would also like to thank the families, faculty, and staff at the Schoenbaum Family Center in the College of Education and Human Ecology at The Ohio State University for their cooperation and support. A special thanks to Tara Strang for serving on my committee.

Finally, I would like to thank Dr. Piasta for allowing me to pursue this project, and her invaluable guidance, support and insight during our time working together.

Abstract

The Ages and Stages Questionnaire (ASQ) is a widely-used screener of young children's cognitive, physical, and social development delays. According to the developers, the ASQ is typically completed by children's caregivers. However, ASQs are occasionally completed by teachers or other professionals in early childhood settings across the country. Studies have found that childcare provides, including preschool teachers, parents of preschoolers and kindergarten teachers all hold different concerns and expectations (i.e., academic and behavioral skills) when considering a young child's academic performance and school readiness. This study examines the agreement between caregivers and professionals with respect to completing ASQ-3, and the validity of respondents when compared to the Preschool-Language Scale (PLS-5) an objective and unbiased third party measure. Utilizing reports from 52 children's caregiver and teacher ASQ-3 reports and PLS-5 screeners, three findings emerged: (a) a majority of ratings by caregivers and teachers agreed when assessing the developmental risk level of a young child, however evidence concerning disagreement was compelling; (b) although few predictors of caregiver-teacher disagreement were identified, agreement of risk level was higher for children whose mothers had completed or gone beyond a high school diploma than for children whose mothers did not in the communication domain; (c) caregivers, but not teachers, exhibited significant, yet moderate in magnitude, correlations in ratings with scores on a direct assessment suggesting caregivers ratings are more valid than those of teachers.

Keywords: teacher-report, caregiver-report, agreement, developmental risk

The Comparability and Validity of Teacher and Caregiver Ratings Regarding Young Children's Development

Mounting evidence suggests that developmental difficulties begin as early as kindergarten and first grade, posing a threat to later academic achievement if not addressed (McClelland, Morrison, & Holmes 2000; Alexander & Entwisle, 1988; Lewitt & Baker, 1995). Despite the fact that between 5 and 10% of all children in the United States exhibit developmental difficulties, only 30% of these difficulties are discovered before a child enters school (Hornman et al, 2013). Evidence suggests that early experiences and intervention can successfully address such issues, and these children tend to fare better than those who receive intervention at later points (Ramey & Ramey, 2004). Identifying potential issues requires reliable and valid screening assessments. However, screening all children with direct assessments to identify developmental difficulties is expensive and time consuming. Thus, short yet valid indirect screening instruments such as surveys are often used to identify children at developmental risk (Hornman et al, 2013). When utilizing these indirect measures, reports are often completed by caregivers, childcare professionals (e.g., teachers and pediatricians), or both.

Children's risk for developmental difficulties and the extent to which this risk is observable by caregivers and childcare professionals can be understood via the bioecological model of development (Bronfenbrenner & Morris, 1998). This model examines the development of a child in the context of a system of relationships, focusing on the interactions between children and the various systems within their environments. With the child at the center of this model, the innermost system, the microsystem, is comprised of the interpersonal relationships experienced and social roles assumed by the child both at home and at school, which directly

affect development. A child's development is also affected indirectly by elements of the second layer of the environment, the mesosystem, which is comprised of the interactions between two or more settings of the microsystem. Such interactions, such as when caregivers take an active role in a child's education, can facilitate the child's growth and development. In contrast, if the two caretakers disagree on developmentally appropriate tasks and behaviors, this may hinder the child's development (Bronfenbrenner & Morris, 1998). Framing the current study within this theory is important for three reasons. First, by applying the bioecological model, developmental risk is understood with respect to both the individual and as a result of cultural factors. Second, this model allows for greater awareness of factors that may be viewed as indicators of developmental risk and highlights behavior as occurring in context. This is important given that adults may observe children differently depending on their role and setting and that behaviors identified as indicating risk may differ across settings. Finally, this model has implications for addressing developmental risk, in that appropriate intervention within the microsystem and mesosystem can be implemented when risk is identified. However, in cases in which risk is not identified, opportunities to alter the microsystem and mesosystem and thereby better support a given children are lost. These points highlight the need for attending to developmental risk and examining the extent to which it is reliably identified by those involved in different aspects of the children's microsystem, specifically caregivers and teachers. The current study examines the comparability and validity of caregiver and teacher ratings of risk and, subsequently, the factors that may contribute to disagreement among these adults.

Developmental Risk in Early Childhood

Early childhood is a period of great significance when considering children's development. The skills and abilities that children acquire during the years from birth to school entry set the stage for their development throughout the elementary school years and beyond. For example, McClelland's longitudinal study concluded that young children with more positive academic behaviors such as listening, following directions, participating in activities, staying on task, and keeping materials organized experienced greater academic achievement in reading, mathematics, and vocabulary skills from school entrance through the second grade compared to their peers with less favorable academic behaviors (McClelland et al, 2000). Conversely, difficulties during the early childhood years can translate to continued difficulties in skill development. For example, children identified as at risk for social-emotional and behavioral skills during the early years were found to have later difficulties in academic areas such as language, reading, and math, as well as exhibit more externalizing behaviors (Rhoades, et. al, 2011; Welsh, et. al., 2001; Vandell, et. al., 2010).

Importantly, however, not all children who exhibit risk during early childhood will continue to experience difficulties. As would be expected based on developmental theories that highlight interactions between the child and his or her environment such as the bioecological model, evidence suggests that early childhood experiences can affect children's later outcomes (Jerome, Hamre, & Pianta, 2009; Burchinal & Peisner-Feinberg, 2004; McClelland et al, 2000). Accumulating research, for instance, suggests that early risk may be mitigated through high-quality preschool instruction and/or targeted early intervention (Reynolds et al, 2001; Wasik et al, 1990; Campbell & Ramey, 1994). Thus, early childhood is also notable as an optimal time for detecting and preventing potential developmental and behavioral difficulties (Koch & Deimann,

2011). Indeed, federal programs and policies such as Head Start/Early Head Start and the early intervention services provided under the Individuals with Disabilities Education Act are predicated on this premise. For early intervention and prevention efforts to be effective, however, children's skills and abilities, along with potential areas of difficulty, must be accurately assessed.

Assessment of Developmental Risk

One option for assessing young children's early skills and abilities is to use direct assessment. These assessments are administered by an assessor, requiring a child to perform tasks in response to a set of instructions. A vast array of early screeners and developmental inventories utilize the direct assessment method. Examples include the Learning Accomplishment Profiles – Third Edition, (LAP–3; Hardin & Peisner-Feinberg, 2004), Mullen Scales of Early Learning (Mullen, 1995), and the Galileo Preschool Assessment Scales (Bergan, Richard, Burnham, Feld, & Bergan, 2009). Direct assessment is beneficial as it minimizes the effect of perception and biases of the respondent, thus increasing validity by directly examining the child's abilities (Lonigan, Allan, & Lerner 2011). However, implementation of direct assessment is difficult on a large scale. These difficulties include the time required to assess each child directly, the substantial amount of training required to effectively and reliably assess children by early child care providers and educators, and the cost required to administer the assessment.

Because of the challenges inherent in direct assessments, early childhood professionals often rely on indirect assessments to assess young children's skills and abilities and to screen for potential difficulties. Indirect assessments are often rating scales, through which the assessor

rates his or her perception of behavior or skills of others. Indirect assessments rely on the assessor's judgement of an an individual's knowledge and abilities rather than directly observing these. Commonly used early childhood developmental screeners include the Preschool and Kindergarten Behavior Scales – 2nd Edition (PBKS-2; Merrell, 1994), Infant/Toddler Symptom Checklist (ITSC; DeGangi et al. 1995), and the Early Childhood Inventory-4 (ECI- 4; Sprafkin et al, 2002). Benefits of indirect assessments include brevity, minimal training requirements, and lower cost.

The Ages and Stages Questionnaire (ASQ-3; Squires & Bricker, 2009) is one of the most widely used indirect assessments in early childhood. It has been used by pediatricians, public health nurses, home visitors, child welfare workers, and Head Start teachers. Childcare centers in all 50 states have relied on the ASQ-3 as a developmental screener, and the ASQ-3 has also been used in countries other than the United States (Hornman et al, 2013; Squires & Bricker, 2009). The ASQ-3 is used to screen children between the ages of one month and five and a half years for delays in five developmental domains (i.e., communication, gross motor, fine motor, problem solving, and social skills) in order to determine if further assessment or ongoing monitoring is required (Squires & Bricker, 2009). The ASQ-3 asks respondents to rate whether a child exhibits various observable behaviors aligned to each of the developmental domains using a scale of "yes," "sometimes," and "not yet." Total scores are calculated for each domain and compared to a cut-off established for the child's specific age level. Depending on where the domain score falls, the child will be placed into either a low, moderate, or substantial risk category. If risk is identified, additional screening, potential intervention or extra supports, or other potential next steps are recommended. Notably, although the ASQ-3 was designed to be completed by

children's primary caregivers, other professionals such as early childhood teachers may also complete the ASQ-3. This raises the issue of whether or not ASQ-3 ratings are the same regardless of who completes the assessment.

Comparability of Caregiver and Teacher Ratings

A few studies have examined agreement between caregivers and teachers when providing indirect assessments of children. Agreement between caregivers and teachers has been shown to be low to modest across multiple domains (Winsler, 2002; Stanger & Lewis 1993; Cai, Kaiser, & Handcock, 2004). Winsler (2002) found that caregivers perceived their children to have more behavior problems than did teachers, with teacher ratings associated with a child's classroom behaviors such as observed goal-directed activity, sustained attention, peer affiliation, and proximity to the teacher in the classroom. Other findings note differences in the problem behaviors perceived by caregivers and teachers as stemming from the roles and responsibilities they have to the child (Cai et al, 2004). In general, caregivers and teachers have differential experiences and shared environmental contexts with a child, and a teacher may not have the opportunity to observe the same behaviors as caregivers (e.g., interacting with unfamiliar adults). Additionally, teachers may perceive behaviors such as shyness as academically-focused and not the child's everyday behavior. Thus, disagreement may be due to inconsistent frames from which references are drawn when rating a child's behavior (Rudasill et al, 2014). Additional reasons why agreement may not be expected between teacher and caregiver ratings of children's development are described below.

Socioeconomic status. Ratings by teachers and caregivers may not align because children from lower socioeconomic status backgrounds are perceived by teachers to exhibit

greater risk. This perception is grounded in the vast body of literature showing developmental and achievement gaps between children from low socioeconomic and high socioeconomic backgrounds (Harvey & Stalin, 1997; Podell & Soodak 1993; Doyle, Finnegan, & McNamara, 2012; Hauser-Cram et al. 2003). More specifically, Harvey (1997) found that teachers were more likely to perceive a child to "fail" if they appeared to be from a lower socioeconomic class. Similarly, teachers have generally been found to hold lower educational expectations for low-income youth compared with their higher income peers (Brenner & Mistry, 2007). Because teachers expect that these children will exhibit greater risk, they may be more likely to rate them as displaying more risk behaviors than their peers. However, caregivers may be less likely influenced by such preconceived expectations.

Time enrolled in program. Ratings by teachers and caregivers may not align when a child has been newly enrolled in a school setting**.** As a child spends more time in a child care or school setting, he or she will become more accustomed to the fact that behaviors that are acceptable at home may not be acceptable at school and vice-versa (Doyle et al., 2012). This realization by children may result in fewer behaviors considered to be problematic in the classroom, thus better aligning behaviors to settings as the child's time enrolled increases. Additionally, as a child spends more time enrolled in a school setting, teachers will have more opportunity to observe a child's behavior and interactions with peers.

Gender. Ratings by teachers and caregivers children may not align due to gender-specific perceptions of academic abilities and behavior. Although past studies have found the effect of gender on caregiver and teacher agreement to be notable but not significant (Winsler & Wallace, 2010; Cai, Kaiser, & Hancock, 2004), other studies have found evidence that boys express more

behavior problems than their female peers as females tend to exhibit more on-task behavior and positive approaches to learning. (Robinson, Lubienski, et al 2014; Winsler, 2002; Jerome, Hamre, & Pianta, 2008). Thus, boys may be more likely to be identified as being at risk by their teachers if similar behavior problems are not exhibited outside the classroom. Additionally, boys have been shown to be rated significantly lower by both preschool and kindergarten teachers than girls when assessing readiness, academic, and communications skills (Mashburn & Henry, 2004). By extension, teachers might be more likely to rate boys as lower in terms of developmental skills than girls, whereas caregivers may not show this gender bias.

The Purpose of Present Study

Research on measures other than the ASQ have often shown low to modest agreement between teacher-reports and caregiver-reports (e.g., Cai, Kaiser, & Hancock, 2004; Winsler & Wallace, 2002). However, the agreement between caregiver and professionals with respect to completing the Ages and Stages Questionnaire screener is unknown. The major purpose of the present study was to investigate the extent to which caregiver and teacher ratings were similar and the extent to which ratings placed the child in the same overall category of development. In addition, given the literature suggesting reasons as to why ratings by different adults may not agree, I also examined the extent to which any differences in ratings were explained by socioeconomic status, the amount of time the child has been enrolled in the school program, and child gender. Finally, to further understand any disagreement among ratings, I examined the validity of caregiver and teacher ratings as compared to a direct assessment.

Method

Participants

Data from the present study came from the fall 2013 Schoenbaum Family Center Longitudinal Archival Database. Data were requested for children (a) who were between the age of 2 to 5 years as of September 2013, (b) who were enrolled at the center during fall 2013, and (c) whose caregivers consented to have their data included in the repository.

Data from fifty-two children were utilized for this study. Twenty six of these children (50%) were male. On average, participating children were 46 months old (range: 24 to 60 months). Most participants were reported to be African American/Black (32.69%) or White/ Caucasian (30.77%); 11.54% were multiracial, and 5.76% were Asian (19.23% did not report race information). Additionally, 11.3% identified as Hispanic or Latino. Annual household incomes of children's families ranged from less than $10,000 (17.3%) to over $120,000 (23.1%); 28.8% lived in households with incomes between $10,001 and $40,000 annually, 13.4% lived in households with incomes between $40,001 and $80,000 annually, and 7.6% lived in households with incomes between $80,001 and 120,000 annually (11.5% did not report income information). Reports of maternal education levels indicated that 3.8% of children's mothers did not hold a high school diploma, 9.6% had a high school diploma as their highest degree, 11.5% had an Associate's degree as their highest degree, 15.4% had a Bachelor's degree as their highest degree, 25% had a Master's degree as their highest degree, and 11.5% had a Doctorate (maternal education not reported for 23.1% of the sample).

Procedures and Measures

The study was descriptive/correlational in nature. Data were collected in the fall of 2013. Data of interest, accessed via the repository, included: (a) the Ages & Stages Questionnaire Third Edition (ASQ-3) completed by both teachers and caregivers, (b) a caregiver enrollment questionnaire, and (c) the Preschool Language Scale Fifth Edition (PLS-5) screener.

Ages and Stages Questionnaire – 3 (ASQ-3). The ASQ-3 is an indirect assessment used to screen children (birth through 5-years of age) for evidence of developmental difficulties across 5 domains: communication, gross motor, fine motor, problem solving, and personal-social abilities (Squires & Bricker, 2009). The assessment is delivered via 21 age-appropriate questionnaires at 2, 4, 6, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54, and 60 months of age. The ASQ-3 asks respondents to report whether the child exhibits certain behaviors on a scale of "yes," "sometimes," and "not yet" (e.g., "Does your child help turn the pages of a book?"). Responses are scored (0 points for responses indicating as "not yet," 5 points for responses indicating "sometimes," and 10 points for responses indicating "yes") and summed to provide total scores for each domain; categorical scores describing overall risk level are also determined for each domain by comparing the summed total to a cutoff established by the developer. Research on over 15,000 diverse children has determined the ASQ-3 to be both reliable (α .51 to .87; Squires & Bricker, 2009) and valid. With respect to the latter, the ASQ-3 demonstrated moderate to high agreement in identifying children at risk as compared to the Battelle Developmental Inventory (Newborg, et. al., 1984; Squires & Bricker, 2009) and also shows excellent sensitivity (.86) and specificity (.85; Squires & Bricker, 2009). For children

enrolled at the Schoenbaum Family Center in fall of 2013, the ASQ-3 was completed independently by both a given child's teacher and his or her caregiver.

Caregiver enrollment questionnaire. A questionnaire was administered by the Schoenbaum Family Center staff to the caregivers of all children upon enrollment at the center in autumn 2013. Caregivers were asked to report basic demographic and background information. For this study, I extracted three variables from the caregiver questionnaire. First, I extracted maternal education level as an indicator of socioeconomic status. When completing the questionnaire, respondents indicated children's mother's education level from multiple options: 8th grade or less; some high school, but no diploma; high school diploma or GED; some college, but no degree; Associates degree or other two year degree; Bachelor's degree; at least one year of coursework beyond Bachelor's; Master's degree; education specialist or professional diploma beyond Master's; Doctoral degree; don't know; or not applicable. For analysis purposes, these responses were recoded as highest degree earned: Less than a high school diploma (8th grade or less, some high school, but no diploma); high school diploma (high school diploma or GED, some college but no degree); Associates degree (Associates degree or other two year degree); Bachelor's degree (Bachelor's degree, at least one year of coursework beyond Bachelor's); Master's degree (Master's degree); Doctoral degree (education specialist or professional diploma, Doctoral degree). Second, I extracted the date of enrollment reported by caregivers and computed the amount of time (in months) that the child had been enrolled in the program as of September 10 2013. Time was represented in analyses via a series of dummy codes in which less than one month of previous enrollment was recorded as zero months, between one and eleven months of previous enrollment was recorded as 1-11 months, and over twelve months of

previous enrollment was recorded as 12+ months. Third, I extracted the child's gender, subsequently dummy coded as male (1) or female (0). Descriptive statistics for these and other variables are indicated in Table 1 and Table 2.

Table 1. Child and family characteristics (categorical variables)

Variable	*n*	%
Female (child gender)	26	50
Race/ethnicity		
White/Caucasian	21	40.4
Black/African American	22	42.3
Hispanic/Latino	6	11.5
Pacific Islander/ Native Hawaiian	1	1.9
Asian	5	11.9
American Indian/Alaskan	1	1.9
Highest Maternal Degree		
Less than a high school diploma	2	3.8
High school diploma	5	9.6
Associate's degree	6	11.5
Bachelor's degree	8	15.4
Master's or specialist degree	13	25
Doctorate	6	11.5
Time enrolled in program		
0 months enrolled	8	15.4
1-11 months enrolled	33	63.5
12+ months enrolled	11	21.2

Note. Percentages may not sum to 100% due to rounding or data that were unreported.

Table 2. Child characteristics (continuous variables)

Variable	*M*	*SD*	Range
Child age (in months)	46.04	9.89	24-60
Time enrolled in program (in months)	7.96	12.76	0-56

Preschool Language Scale–5 (PLS-5). The PLS-5 is a direct assessment used to screen children ages birth through 7 years for language difficulties (Zimmerman, Steiner, & Pond, 2011). The PLS-5 was individually administered to children in a quiet school setting in early fall by trained research assistants. All assessors were comprehensively trained utilizing a 4-step process: (1) assessors participated in a group training module that presented detailed administration information; (2) assessors scored at least 85% on a written quiz about the measure; (3) assessors observed administration in the field by a skilled assessor; and (4) assessors were supervised for two administrations.

On the PLS-5, the child is asked to verbally respond to a series of various questions and prompts within a given category (e.g., recognize actions such as sleeping, running, and eating displayed in a picture in the testing manual). Item responses are scored individually as correct or incorrect according to criteria in the manual, and the child is assigned 1 point for the overall category if he or she meets the requirement of correct answers established for his or her age (e.g., 3-year-old children must answer four of the six language questions correctly). A total score across all categories is computed as the sum of the category scores. Research has determined the

PLS-5 to be both reliable and valid (Zimmerman et. al, 2011). Inter-rater reliability ranged from .95 to .98. Sensitivity is reported as .83 to .91, and specificity is reported as .78 to .80. The PLS-5 correlates at .64 to .75 with the Clinical Evaluation of Language Fundamentals–Preschool 2 (Wiig, Secord & Semel, 2004).

Results

The number of children identified in each risk category presented in Table 3, with descriptive information concerning caregiver and teacher ratings on the ASQ-3 presented in Table 4. As one would expect, a majority of children were categorized as low risk. However, there were instances in which children were categorized as moderate and high risk in terms of caregiver and teacher ratings. When looking at the raw total scores, scores averaged between 49 to 57 points with teachers exhibiting a broader range in response, many of which were lower averages than the averages reported by caregivers.

Table 3. Frequency of ASQ-3 caregiver and teacher risk level

	Caregiver report					Teacher report				
	CCT	CGT	CFT	CPT	CST	TCT	TGT	TFT	TPT	TST
N	52	52	52	52	52	52	52	52	52	52
Low risk	49	46	48	50	47	41	50	48	47	49
Moderate risk	2	5	3	1	3	9	1	2	3	2
High risk	1	1	1	1	2	1	0	1	1	0
Missing	0	0	0	0	0	1	1	1	1	1

Note. Caregiver communication total score (CCT), caregiver gross motor total score (CGT), caregiver fine motor total score (CFT), caregiver problem solving total score (CPT), caregiver personal social total score (CFT), teacher communication total score (TCT), teacher gross motor total score (TGT), teacher fine motor total score (TFT), teacher problem solving total score (TPT), teacher personal social total score (TFT),

Table 4. ASQ-3 caregiver and teacher total score descriptive statistics for each domain

	Caregiver report					Teacher report				
	CCT	CGT	CFT	CPT	CST	TCT	TGT	TFT	TPT	TST
N	51	51	51	51	50	50	51	51	51	51
M	55.59	54.51	51.08	56.57	55.50	49.40	54.90	49.90	53.53	54.61
SD	6.45	7.63	10.26	5.05	6.25	10.96	5.70	11.07	9.07	6.70
Min	35.00	35.00	20.00	40.00	40.00	5.00	40.00	25.00	10.00	35.00
Max	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00

Note. Caregiver communication total score (CCT), caregiver gross motor total score (CGT), caregiver fine motor total score (CFT), caregiver problem solving total score (CPT), caregiver personal social total score (CFT), teacher communication total score (TCT), teacher gross motor total score (TGT), teacher fine motor total score (TFT), teacher problem solving total score (TPT), teacher personal social total score (TFT),

Agreement Between Caregiver and Teacher Ratings

To address the extent to which caregiver and teacher ratings were similar, correlations between caregiver and teacher total score ratings were computed (see Table 5). Results demonstrated that caregiver ratings were significantly and positively related to corresponding teacher ratings for all developmental domains (e.g., caregiver communication ratings are correlated with teacher communication ratings, caregiver gross motor skills ratings are correlated with teacher gross motor skills ratings). However, these correlations were low to moderate in magnitude.

Table 5. Correlations between ASQ-3 subscores

Variable Name	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Caregiver Communication Total Score	.402**	.141	.431**	.381**	.289	.154	.472**	.077	.403**
2. Caregiver Gross Motor Total Score	-	.288*	.319*	.536**	.412**	.510	.154	.285*	.242
3. Caregiver Fine Motor Total Score		-	.304*	.142	.035	.159	.355	.030	.081
4. Caregiver Problem Solving Total Score			-	.086	.431**	.310*	.213	.505	.187
5. Caregiver Personal Social Total Score				-	.220	.134	.123	.108	.302
6. Teacher Communication Total Score					-	.447**	.364**	.664**	.363**
7. Teacher Gross Motor Total Score						-	.269	.432**	.392**
8. Teacher Fine Motor Total Score							-	.198	.519**
9. Teacher Problem Solving Total Score								-	.394**
10. Teacher Personal Social Total Score									-

Note. *p < .05; **p < .01; ***p < .001

Table 6. ASQ-3 difference score descriptive statistics

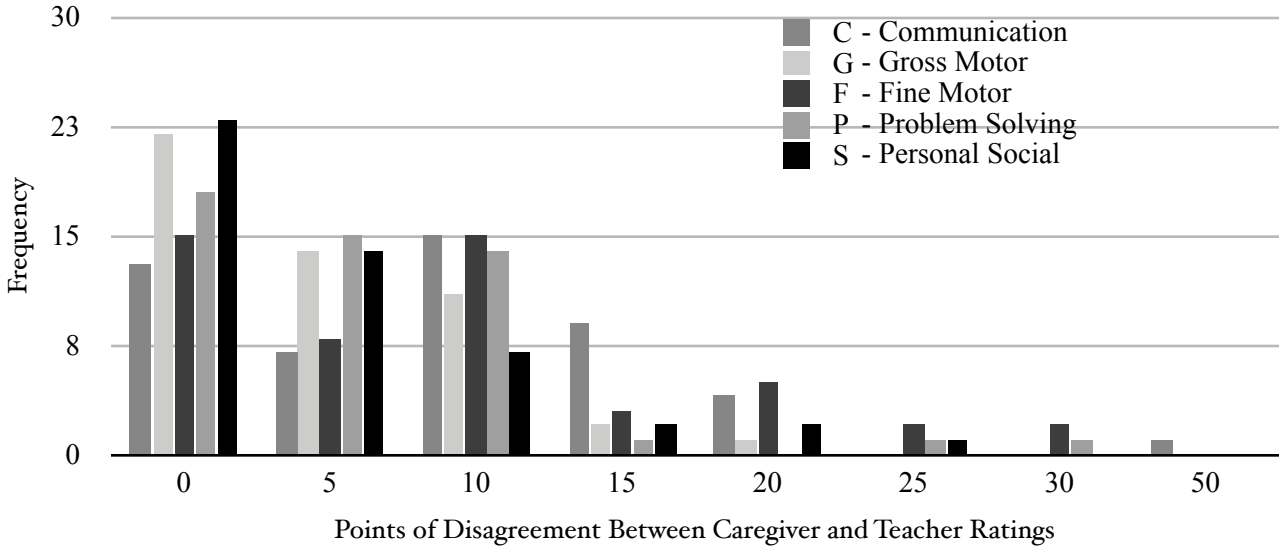
	Communication Difference Score	Gross Motor Difference Score	Fine Motor Difference Score	Problem Solving Difference Score	Personal Social Difference Score
n	49	50	50	50	49
SD	8.74	5.03	8.41	6.23	6.12
Min	0.00	0.00	0.00	0.00	0.00
Max	50.00	20.00	30.00	30.00	25.00
M	9.18	4.60	8.90	5.70	4.80
Skewness	2.09	0.92	0.85	1.77	1.50
SE	0.34	0.34	0.34	0.34	0.34
Kurtosis	8.67	0.36	0.07	4.76	2.06
SE	0.67	0.66	0.66	0.66	0.67

Note. Difference scores were calculated by finding the absolute value of the difference between caregiver rating subtotals and teacher rating subtotals. The Ages and Stages Questionnaire reports subtotals and totals in increments of 5. Variation in number of total respondents is due nonrespondents.

As a further means of examining the extent to which caregiver and teacher ratings differed, difference scores between pairs of ratings were calculated. Difference scores were calculated as the absolute value of the caregiver rating minus the teacher rating. Descriptive statistics for difference scores are presented in Table 6. The domains in which caregiver ratings and teacher ratings had the largest difference in scores were communication and fine motor skills. Smaller differences were exhibited for gross motor, problem solving, and personal social skills. The histogram in Figure 1 shows the distribution of difference scores among caregivers and teachers, with the frequency along the y axis, and the magnitude of difference scores along the x axis. This figure highlights the extent of positive skew. As expected, a majority of children have a difference score of 0, indicating that that caregivers and teachers assigned the same rating of risk. However, extent of disagreement becomes more important on the right end of the x axis

as the extent of disagreement becomes more extreme.

Figure 1. Differences in frequencies between caregiver- and teacher ratings



Agreement of Risk Level Between Caregiver Ratings and Teacher Ratings

In continuing to analyze the study's first aim, specifically the extent to which these scores placed the child in the same overall category of development, cross tab analyses were used to compare the categories into which caregivers and teachers placed children (Tables 6-10). These tables indicate whether caregivers and teachers agreed as to the extent to which a given child exhibited risk (high, moderate, low) across the various domains and are particularly important as such categories are often used to determine whether or not a child receives further assessment or support. Agreement between caregiver and teacher ratings was highest for the gross motor risk (92.10%), followed by fine motor and problem solving risk (90.20%). When caregivers and teachers disagreed (e.g., caregiver indicated substantial risk and teacher indicated low or moderate risk, caregiver indicated moderate risk and teacher indicated low or substantial risk, caregiver indicated low risk and teacher indicated moderate or substantial risk), they were most

likely to disagree with respect to communication for which there were eleven instances of disagreement in risk level, (21.57% of all communication of risk), followed by personal social risk for which there were seven instances of disagreement in risk level (13.72% of all personal social risk).

Table 7. Communication Risk Crosstabs

		ASQ-3 Communication Cutoff Teacher			Total
		Substantial Risk	Moderate Risk	Low Risk	
ASQ-3 Communication Cutoff Caregiver	Substantial Risk	0	0	1	1
	Moderate Risk	0	1	1	2
	Low Risk	1	8	39	48
Total		1	9	41	51

Table 8. Gross Motor Risk Crosstabs

		ASQ-3 Gross Motor Cutoff Teacher			Total
		Substantial Risk	Moderate Risk	Low Risk	
ASQ-3 Gross Motor Cutoff Caregiver	Substantial Risk	0	0	1	1
	Moderate Risk	0	1	3	4
	Low Risk	0	0	46	46
Total		0	1	50	51

Table 9. Fine Motor Risk Crosstabs

		ASQ-3 Fine Motor Cutoff Teacher			Total
		Substantial Risk	Moderate Risk	Low Risk	
ASQ-3 Fine Motor Cutoff Caregiver	Substantial Risk	0	0	1	1
	Moderate Risk	0	1	2	3
	Low Risk	1	1	45	47
Total		1	2	48	51

Table 10. Problem Solving Risk Crosstabs

		ASQ-3 Problem Solving Cutoff Teacher			Total
		Substantial Risk	Moderate Risk	Low Risk	
ASQ-3 Problem Solving Cutoff Caregiver	Substantial Risk	0	0	1	1
	Moderate Risk	1	0	0	1
	Low Risk	0	3	46	49
Total		1	3	47	51

Table 11. Personal Social Risk Crosstabs

		ASQ-3 Personal Social Cutoff Teacher			Total
		Substantial Risk	Moderate Risk	Low Risk	
ASQ-3 Personal Social Cutoff Caregiver	Substantial Risk	0	0	2	2
	Moderate Risk	0	0	3	3
	Low Risk	0	2	44	46
Total		0	2	49	51

Further analyses examined the extent to which any disagreements between caregivers and teachers constituted extreme disagreement, or cases in which respondents were two categories of risk apart (i.e., caregiver indicated low risk and teacher indicated high risk or caregiver indicated high risk and teacher indicated low risk). Instances of extreme disagreement are important to consider as one rating indicates that a child needs further evaluation whereas the other rating indicates that there are no concerns about a child's functioning. Results demonstrated that both communication and personal social risk showed the most instances of extreme disagreement, with two instances in each (Table 12). This is important to note as extreme disagreement accounts for 18.17% of total reported disagreement of communication risk, and 28.57% of total reported personal social risk.

Table 12. Percent disagreement by category of risk

Risk category	Percent moderate disagreement	Percent extreme disagreement	Percent total disagreement
Communication	17.65	3.92	21.57
Gross Motor	5.88	1.96	7.84
Fine Motor	5.88	3.92	9.80
Problem Solving	7.84	1.96	9.80
Personal Social	9.80	3.92	13.72

Explanatory Factors: SES, Gender, and Amount of Time as Predictors of Differences Between Caregiver and Teacher Ratings

To investigate the extent to which differences in caregiver and teacher ratings were explained by socioeconomic status, child gender, and length of enrollment, regression analyses were conducted. Dummy codes representing maternal education, child gender, and time enrolled in the program were included as independent variables in regression analyses, and the absolute values of difference scores between caregiver and teacher ratings on ASQ-3 domains served as the dependent variables. Regression results for communication skills are presented in Table 13; results for other domains are presented in the Appendix.

Results indicated that, for the communication domain, agreement was greater for children whose mothers completed any formal degree as opposed to those whose mothers did not complete high school. For gross motor skills, agreement was greater for children whose mothers had a Doctoral degree as opposed to those whose mothers had a Bachelor's degree. For fine motor skills, (a) agreement was greater for children whose mothers had a Master's or Doctoral degree as opposed to those whose mothers had a Bachelor's degree, (b) agreement was lower for children whose mothers had a Bachelor's degree as opposed to those whose mothers who had not

completed high school, and (c) agreement was higher for children who had been newly enrolled in the program, as well as those enrolled greater than 12 months, as opposed to those who had been enrolled for 1 - 11 months. For problem solving, agreement was greater for children whose mothers had completed a Bachelor's, Master's, or Doctoral degree as opposed to those whose mothers did not complete high school. No factors were predictive when considering the personal social domain, and all factors not otherwise discussed above were not significant predictors. Overall, no consistent pattern was identified as to factors that explained disagreement between caregiver and teacher ratings.

Table 13. Summary of regression analysis of communication risk difference scores

Coefficient	*F*	*Sig.*	*R2*	*t*	*Sig.*
Maternal Education	1.452	0.233	0.185		
HS v. none				-2.110	0.043*
AA v. none				-2.139	0.040*
BA v. none				-2.093	0.044*
MA v. none				-2.479	0.019*
Ph.D v. non				-2.589	0.019*
AA v. HS				0.030	0.976
BA v. HS				0.193	0.848
MA v. HS				-0.260	0.796
Ph.D v. HS				-0.577	0.568
BA v. AA				0.170	0.866
MA v. AA				-3.13	0.756
Ph.D v AA				-0.637	0.529
MA v. BA				-0.540	0.593
Ph.D v. BA				-0.851	0.401
Ph.D v. MA				-0.412	0.683
Time Enrolled	0.070	0.932	0.003		
1-11 v. none				0.258	0.798
12 + v. none				-0.016	0.987
12+ v. 1-11				-0.319	0.751
Child Gender	0.478	0.493	0.010		
Male				0.691	0.493

Note. The following aberrations of material education indicates failure to obtain a high school diploma (none), obtained a high school diploma (HS), obtained an Associate's degree (AA), obtained a Bachelor's degree (BA), obtained a Master's degree (MA), obtained a doctoral degree (Ph.D). Time enrolled was reported in months.
*p < .05; **p < .01; ***p < .001

Table 15. ASQ-3 caregiver rating of communication risk compared to PLS-5 reported risk

		PLS-5 Pass/Fail		Total
		Fail	Pass	
ASQ-3 Communication Risk	Fail	1	2	3
	Pass	10	36	46
Total		11	38	49

Note. ASQ-3 was recoded such that low risk was considered passing and moderate and substantial was considered failing.

Validity of Caregiver and Teacher Ratings

To address the third aim concerning the validity of caregiver and teacher ratings, communication ratings on the ASQ-3 were compared to children's direct assessment scores from the PLS-5. As the archival data set only had a direct assessment of language skills, communication was the only domain to which validity could be determined. Moreover, as indicated in the results presented above, caregivers and teachers often disagreed on their communication ratings. Two sets of analyses were conducted.

First, correlation analyses were conducted to compare caregiver ratings and teacher ratings with PLS-5 scores (Table 14). Caregiver's ratings were found to be significantly correlated with PLS-5, but these were of modest magnitude. Interestingly there was no association observed between teacher's ratings and PLS-5.

Table 14. Summary of intercorrelations, means and standard deviations for ASQ-3 scores and PLS-5 Scores

Measure	1	2	3
1. ASQ-3 Caregiver Communication Score	-	.289*	.368*
2. ASQ-3 Teacher Communication Score		-	-.003
3. PLS-5 Score			-

Note. *p < .05; **p < .01; ***p < .001

Second, the ASQ-3 communication levels of risk (low risk, moderate risk, substantial risk) were recoded into two variables: passing, which included those originally identified as low risk according to the ASQ-3, or failing, which included those originally identified as moderate or substantial risk according to the ASQ-3. Cross tab analyses (Tables 15 and 16) were conducted to compare the extent to which caregivers and teachers' pass/fail ratings on the ASQ-3 agreed with pass/fail scores on the PLS-5. In both cases, the majority of children were rated as passing both the ASQ-3 and the PLS-5. A few were rated as failing both on the ASQ-3 rating and the PLS-5. However, there were also instances in which caregiver ratings and PLS-5 scores (12 out of 49 or 24%) and teacher ratings and PLS-5 scores (12 out of 48 or 25%) did not agree. In the majority of these instances, the child was rated as passing by caregivers or teachers on the ASQ-3 but did not pass the PLS-5. Interestingly, teachers seemed more likely indicate a failing rating on the ASQ-3 when the PLS-5 indicated a passing score.

Table 16. ASQ-3 teacher rating of communication risk compared to PLS-5 reported risk

		PLS-5 Pass/Fail		Total
		Fail	Pass	
ASQ-3 Communication Risk	Fail	4	5	9
	Pass	7	32	39
Total		11	37	48

Note. ASQ-3 was recoded such that low risk was considered passing and moderate and substantial was considered failing.

Discussion

The goals of the present study were threefold: (1) to investigate the extent to which caregiver and teacher ratings were similar and placed the child in the same overall category of development, (2) to investigate the extent to which any differences in ratings were explained by

socioeconomic status, the amount of time the child had been enrolled in the school program, and child gender, and (3) to investigate the validity of caregiver and teacher ratings as compared to a direct assessment. Theoretically, this study was driven by the understanding that multiple sources of influence (caregiver, teacher, home, and school) interact and influence the development of a young child (Bronfenbrenner & Morris, 1998). This study adds to the current literature concerning agreement between caregiver and teacher ratings (e.g., Cai, Kaiser, & Hancock, 2004; Winsler & Wallace, 2002). Below, three major findings and their implications are addressed.

First, findings suggest that the majority of ratings by caregivers and teachers agreed when assessing the developmental risk level of a young child. Specifically, agreement ranged from 78.43% (communication) to 92.16% (gross motor skills) across domains. Despite such agreement, evidence concerning disagreement was compelling. Correlations between caregiver and teacher ratings were moderate in magnitude at best, and caregiver and teacher ratings differed by as much as 50 points (communication). This is notable as in most instances difference scores of more than 15 points resulted in extreme disagreement (i.e., instances in which one respondent reported low risk and the other respondent reported substantial risk). Overall, findings concerning disagreement between caregiver and teacher ratings align with the current literature (Cai, Kaiser, & Hancock, 2004; Winsler & Wallace, 2002) and imply that identification of risk should not rely on only one respondent.

Second, few predictors of caregiver-teacher disagreement were identified. Neither time enrolled in the school program nor child gender were significant predictors. One interesting finding, however, was maternal education as a predictor of disagreement within the

communication domain. Agreement was higher for children whose mothers had completed or gone beyond a high school diploma than for children whose mothers did not complete high school. These results compliment the literature showing that a high maternal education results in improved family literacy environments, which has shown to be positively associated with a child's academic skills (Christian, Morrison, & Bryant, 1998). Yet, this finding regarding maternal education was not consistent across all domains. Overall, results concerning predictors of disagreement indicate that understanding why caregivers and teachers may rate children differently is a complex undertaking that requires additional study. Further research is required to determine if another factor, or perhaps a combination of factors (e.g., the race/ethnicity of the caregiver and the race/ethnicity of the teacher, as Hauser-Cram et al [2003] suggests a possible relationship between respondents ethnicity and level of agreement), is predictive of agreement among respondents.

Lastly, caregivers, but not teachers, exhibited significant correlations in ratings with scores on a direct assessment. This might suggest that ratings by caregivers are more valid, although the magnitude of the correlations are low. However, both caregiver and teacher ratings showed equal and substantial levels of agreement in identifying risk as compared to a direct assessment when considering categorical ratings, indicating neither respondent was more valid. Interestingly, however, teachers were more likely to fail a child when the PLS-5 indicated a passing level of risk signifying that the teachers were more cautious when assessing risk. This may be due to the fact that teachers hold higher expectations for developmental outcomes than caregivers, thus rating children as less competent academically. Overall, the current study did not provide substantial evidence concerning the validity of either caregiver or teacher report.

Limitations and Future Directions

The current study is notable for a number of strengths. First, the sample used for this study was more diverse in race, ethnicity and socioeconomic status than other studies (Cai, Kaiser, & Hancock, 2004; Rudasill et al, 2014; Stanger & Lewis, 1993; Winsler & Wallace, 2002), allowing for findings to be applicable to a wide demographic. Second, when assessing caregiver and teacher ratings of risk, multiple methods were utilized including raw scores from the ASQ-3, risk category as defined by age specific cutoffs established by the ASQ-3 developers, as well as the pass or fail risk appraisal populated by the PLS-5. In utilizing such methods, a very nuanced analysis of the extent to with caregivers and teachers agree or disagree with respect to ratings of a child's development was able to be achieved. Lastly, by utilizing the PLS-5, the validity of caregiver and teacher ratings could be assessed as compared to a direct assessment conducted by an objective and unbiased third party, allowing for a baseline for comparison among respondents to be established. Despite these strengths, however, three limitations must be acknowledged. First, the sample size is moderate in size and drawn from a single early childhood program. It is unclear whether results would differ if the study had greater statistical power or if the results would generalize to a different sample. Second, as noted above, many additional predictors of disagreement could have been examined; the current study was limited to information collected in the fall 2013 caregiver questionnaire, and teacher-specific factors could not be investigated. A particularly interesting future direction would be to understand whether children's caregivers were also educators. Given the high number of advanced degrees held by mothers of children in the sample, along with anecdotal information, a significant number of these individuals are likely educators, and this may affect the rates of

agreement. Third, we were only able to assess the validity of caregiver and teacher ratings for the communication domain. Future research should examine validity for other domains as well.

In conclusion, despite substantial agreement, the results of the present study revealed that caregivers and teachers often differed when identifying developmental risk in children. Those utilizing the ASQ-3and other indirect assessments to identify developmental risk are encouraged to obtain ratings from both caregivers and early childhood professionals to better ensure that all children in need of intervention or other supports are identified. Additional work to understand the validity and utility of indirect assessments such as the ASQ-3 is recommended.

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Appendix

Table 17. Summary of regression analysis of gross motor risk difference scores

Coefficient	*F*	*Sig.*	*R2*	*t*	*Sig.*
Maternal Education	1.836	0.133	0.218		
HS v. none				0.124	0.902
AA v. none				0.212	0.833
BA v. none				1.480	0.148
MA v. none				1.022	0.314
Ph.D v. non				-0.212	0.833
AA v. HS				0.115	0.910
BA v. HS				1.870	0.070
MA v. HS				1.270	0.213
Ph.D v. HS				-0.458	0.650
BA v. AA				1.846	0.074
MA v. AA				1.214	0.233
Ph.D v AA				-0.601	0.552
MA v. BA				-0.855	0.399
Ph.D v. BA				-2.488	0.018*
Ph.D v. MA				-1.907	0.065
Time Enrolled	0.085	0.918	0.004		
1-11 v. none				-0.308	0.759
12 + v. none				0.000	1.000
12+ v. 1-11				0.336	0.738
Child Gender	1.324	0.256	0.027		
Male				1.151	0.256

Note. The following aberrations of material education indicates failure to obtain a high school diploma (none), obtained a high school diploma (HS), obtained an Associate's degree (AA), obtained a Bachelor's degree (BA), obtained a Master's degree (MA), obtained a doctoral degree (Ph.D). Time enrolled was reported in months.
*p < .05; **p < .01; ***p < .001

Table 18. Summary of regression analysis of fine motor risk difference scores

Coefficient	*F*	*Sig.*	*R2*	*t*	*Sig.*
Maternal Education	0.891	0.498	0.119		
HS v. none				-0.092	0.927
AA v. none				-0.786	0.437
BA v. none				0.366	0.717
MA v. none				-0.673	0.506
Ph.D v. non				-0.472	0.640
AA v. HS				-0.933	0.357
BA v. HS				0.642	0.525
MA v. HS				-0.820	0.418
Ph.D v. HS				-0.509	0.614
BA v. AA				1.724	0.094
MA v. AA				0.257	0.799
Ph.D v AA				0.445	0.659
MA v. BA				-1.759	0.088
Ph.D v. BA				-1.248	0.221
Ph.D v. MA				0.257	0.799
Time Enrolled	0.372	0.692	0.016		
1-11 v. none				0.762	0.450
12 + v. none				0.807	0.424
12+ v. 1-11				0.222	0.826
Child Gender	1.413	0.241	0.029		
Male				1.189	0.241

Note. The following aberrations of material education indicates failure to obtain a high school diploma (none), obtained a high school diploma (HS), obtained an Associate's degree (AA), obtained a Bachelor's degree (BA), obtained a Master's degree (MA), obtained a doctoral degree (Ph.D). Time enrolled was reported in months.
*p < .05; **p < .01; ***p < .001

Table 19. Summary of regression analysis of problem solving risk difference scores

Coefficient	*F*	*Sig.*	*R2*	*t*	*Sig.*
Maternal Education	1.576	0.194	0.193		
HS v. none				-2.483	0.018
AA v. none				-2.041	0.049
BA v. none				-2.311	0.027*
MA v. none				-2.434	0.020*
Ph.D v. non				-2.670	0.012*
AA v. HS				0.678	0.503
BA v. HS				0.439	0.664
MA v. HS				0.409	0.685
Ph.D v. HS				-0.169	0.867
BA v. AA				-0.297	0.769
MA v. AA				-0.385	0.703
Ph.D v AA				-0.888	0.381
MA v. BA				-0.070	0.944
Ph.D v. BA				-0.653	0.518
Ph.D v. MA				-0.641	0.526
Time Enrolled	0.512	0.603	0.021		
1-11 v. none				1.005	0.320
12 + v. none				0.586	0.560
12+ v. 1-11				-0.329	0.744
Child Gender	2.138	0.150	0.043		
Male				1.462	0.150

Note. The following aberrations of material education indicates failure to obtain a high school diploma (none), obtained a high school diploma (HS), obtained an Associate's degree (AA), obtained a Bachelor's degree (BA), obtained a Master's degree (MA), obtained a doctoral degree (Ph.D). Time enrolled was reported in months.
*p < .05; **p < .01; ***p < .001

Table 20. Summary of regression analysis of personal social risk difference scores

Coefficient	*F*	*Sig.*	*R2*	*t*	*Sig.*
Maternal Education	2.703	0.037	0.291		
HS v. none				1.516	0.139
AA v. none				1.218	0.232
BA v. none				2.123	0.041*
MA v. none				0.326	0.747
Ph.D v. non				0.457	0.651
AA v. HS				-0.452	0.654
BA v. HS				0.720	0.477
MA v. HS				-1.915	0.064
Ph.D v. HS				-1.478	0.149
BA v. AA				1.266	0.214
MA v. AA				-1.492	0.145
Ph.D v AA				1.088	0.289
MA v. BA				-3.133	0.004**
Ph.D v. BA				-2.417	0.021*
Ph.D v. MA				0.249	0.805
Time Enrolled	4.558	0.016	0.162		
1-11 v. none				2.063	0.045*
12 + v. none				-0.268	0.790
12+ v. 1-11				-2.602	0.012*
Child Gender	0.626	0.433	0.013		
Male				0.791	0.433

Note. The following aberrations of material education indicates failure to obtain a high school diploma (none), obtained a high school diploma (HS), obtained an Associate's degree (AA), obtained a Bachelor's degree (BA), obtained a Master's degree (MA), obtained a doctoral degree (Ph.D). Time enrolled was reported in months.
*p < .05; **p < .01; ***p < .001